National Institute of Environmental Health Sciences

TerraSAR-X high-resolution radar remote sensing: An operational warning system for Rift Valley fever risk

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Abstract:

In the vicinity of the Barkedji village (in the Ferlo region of Senegal), the abundance and aggressiveness of the vector mosquitoes for Rift Valley fever (RVF) are strongly linked to rainfall events and associated ponds dynamics. Initially, these results were obtained from spectral analysis of high-resolution (~10 m) Spot-5 images, but, as a part of the French AdaptFVR project, identification of the free water dynamics within ponds was made with the new high-resolution (down to 3-meter pixels), Synthetic Aperture Radar satellite (TerraSAR-X) produced by Infoterra GmbH, Friedrichshafen/Potsdam, Germany. During summer 2008, within a 30 x 50 km radar image, it was found that identified free water fell well within the footprints of ponds localized by optical data (i.e. Spot-5 images), which increased the confidence in this new and complementary remote sensing technique. Moreover, by using near real-time rainfall data from the Tropical Rainfall Measuring Mission (TRMM), NASA/JAXA joint mission, the filling-up and flushing-out rates of the ponds can be accurately determined. The latter allows for a precise, spatio-temporal mapping of the zones potentially occupied by mosquitoes capable of revealing the variability of pond surfaces. The risk for RVF infection of gathered bovines and small ruminants (~1 park/km(2)) can thus be assessed. This new operational approach (which is independent of weather conditions) is an important development in the mapping of risk components (i.e. hazards plus vulnerability) related to RVF transmission during the summer monsoon, thus contributing to a RVF early warning system.

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Resource Description

Early Warning System: ☑

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☑

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Precipitation

Geographic Feature: ☑

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Country

Other African Country: Senegal

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Rift Valley Fever

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Research Article, Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content